Small Business Innovation Research/Small Business Tech Transfer

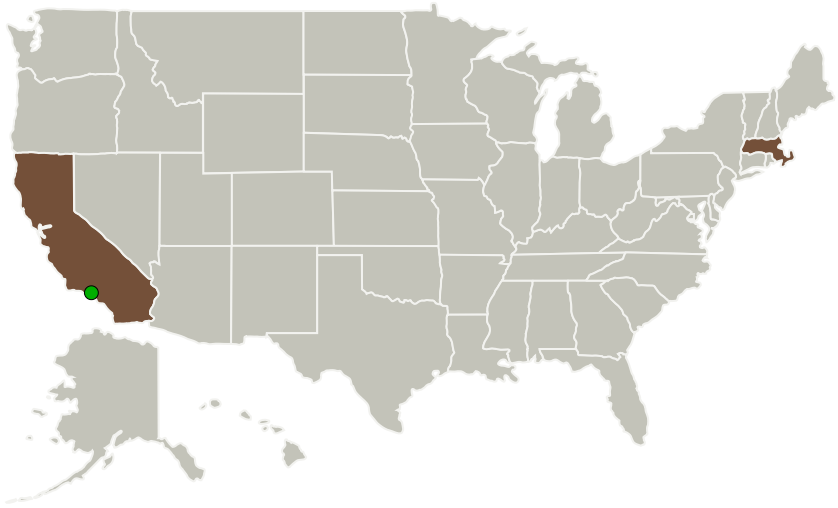
An Enhanced Modular Terminal Descent Sensor for Landing on Planetary Bodies, Phase I

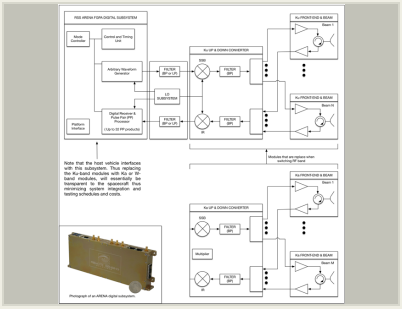
Completed Technology Project (2017 - 2017)

Project Introduction

Remote Sensing Solutions (RSS) proposes to fill a critical niche in Entry, Descent, and Landing with the design and subsequent development of a terrain relative radar altimeter/velocimeter in support of missions to planetary bodies. This sensor, similar to that of the successful Mars Science Laboratory's Terminal Descent Sensor (MSL-TDS) will 1) expand the range of operation over that of the MSL-TDS and 2) mitigate identified risks due to dust and anomalously low backscatter areas. We will achieve this in part by establishing a Ku-band TDS design. In Phase 1 we will explore compact multi-beam shared aperture antenna designs and system trades to minimize antenna aperture size. In addition, the design approach for the system back-end electronics will be modular, compact, reproducible, and highly versatile. Utilizing RSS' novel, modular reconfigurable digital subsystem will enable us to produce reconfigurable architectures and pulse-timing/geometry. Such a solution is independent of the eventual transmit frequency of operation. As such, Ka-band or even W-band sensors could be produced based on this design for landing scenarios where velocity accuracy or size is a premium, and dust or airborne particulates are not a concern. The Phase 1 will establish a design that not only meets the stated MSL-TDS requirements but exceeds them in terms of sensitivity and range of altitudes of operation. We will simulate the sensor capability over the full range of altitude, velocity, and backscatter ranges. A path for demonstration and space-qualification of critical subsystems and components will be evaluated. At the termination of the Phase 1 we will have a design with of the Ku-band TDS, recommendations for a prototype in the Phase 2, a system weight and power estimate and a path-to-space.

Primary U.S. Work Locations and Key Partners





An Enhanced Modular Terminal Descent Sensor for Landing on Planetary Bodies, Phase I Briefing Chart Image

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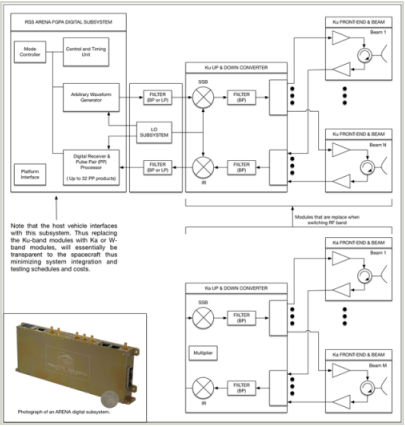
Organizations Performing Work	Role	Type	Location
Remote Sensing Solutions, Inc.	Lead Organization	Industry	Barnstable, Massachusetts
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Massachusetts

Images



Briefing Chart Image
An Enhanced Modular Terminal Descent Sensor for Landing on Planetary Bodies, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/131191)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Remote Sensing Solutions, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

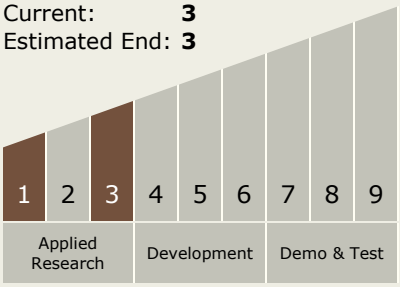
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
James R Carswell

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.4 Vehicle Systems
    - TX09.4.7 Guidance, Navigation and Control (GN&C) for EDL